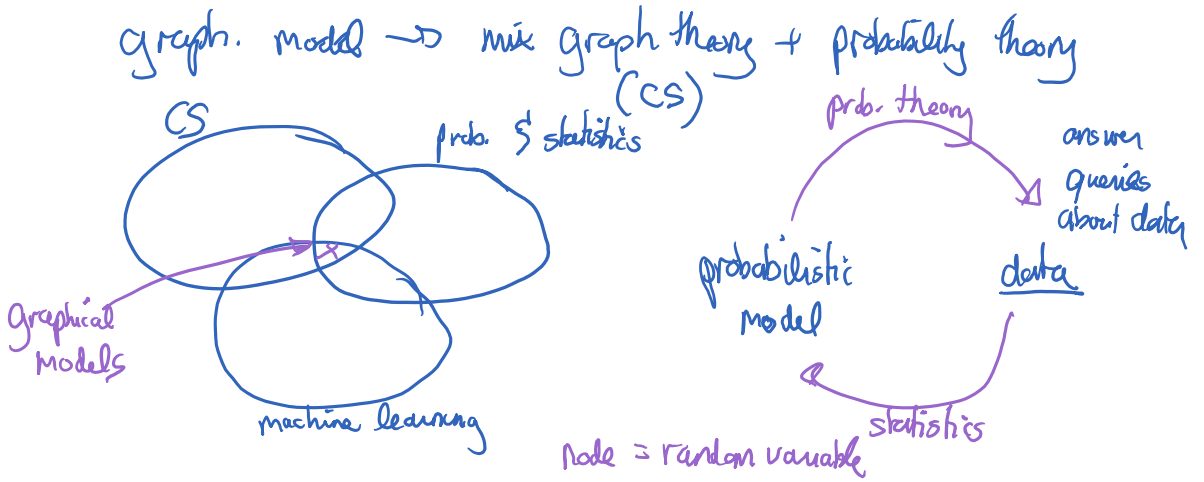


email sign-up by Monday: bit.ly/IFT6269-F21

15h56

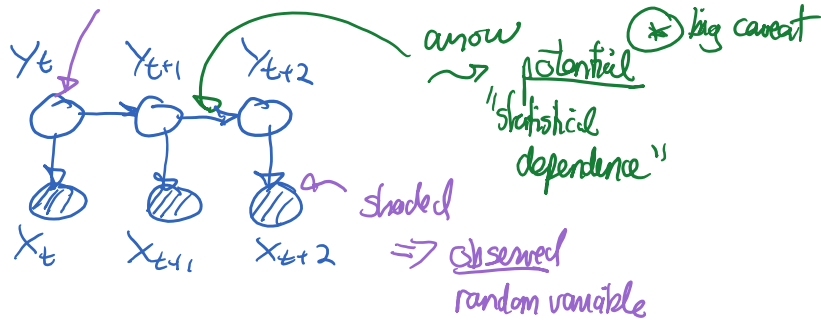
probabilistic graphical model :

model multivariate data



Applications

hidden Markov model (HMM)



a) speech recognition : $Y_t \rightarrow$ "phonemes"

$X_t \rightarrow$ sound waves

b) part-of-speech tagging : Y_t : part-of-speech

$X_t \rightarrow$ words

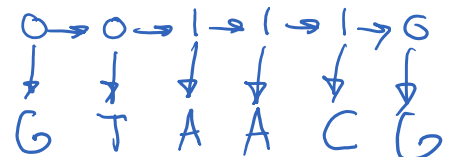
DT - V - DT - ADJ - N
 | | | | |
 This is a red box.

$X_1 X_2 \dots$

c) gene finding :

Y_t : coding vs. non-coding region
 $X_t \rightarrow$ DNA

$Y_t \in \{0, 1\}$



d) control

$$Y_{t+1} = A Y_t + B V_t + \epsilon_t$$

control term 'noise'

note x_t & y_t are obs. vectors

$$x_t = C y_t + \epsilon_t'$$

if ϵ_t & ϵ_t' are Gaussian

HMM \rightarrow "Kalman filter"

Why graphical models?

POS tagging observation $(x_1, x_2, \dots, x_T) \triangleq x_{1:T}$

$x_t \in \{1, \dots, k\}$
size of vocab

want to model $p(x_{1:T})$ issue: exponential size state space

$\Rightarrow k^T - 1$ parameters needed to specify dist.